




Work Order ID 61690

Tuesday, August 31, 2010 11:50:03 AM


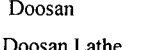
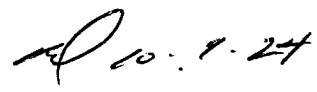


Page 1


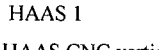
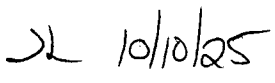
Item ID: D3488-042 Accept  Setup Start 
Revision ID:
Item Name: Blade Fitting Assembly, RH Stop 
Start Date: 8/31/2010 Start Qty: 9.00  Cust Item ID:
Required Date: 9/7/2010 Req'd Qty: 9.00  Customer:
Reference:

Approvals: Process Plan:  Date: Tooling: Date: Run Start 
QC: Date: SPC (Y/N): Date: Stop 

| Sequence ID/ Work Center ID | Operation Description | Set Up/ Run Hours | Tool ID | Tool # | Plan Code | Accept Qty | Reject Qty | Reject Number | Insp. Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
| Draw Nbr | Revision Nbr | | | | | | | | |
| D3488 | Rev B | | | | | | | | |

100  DOOSAN LATHE 0.00
Doosan  Memo 0.00  9 0
Doosan Lathe 1-Turn as per Dwg DSK 101 & Folio FA627□2-Deburr

110  QC2- Inspect parts off machine FAI/FAIB 0.00
QC  Memo 0.00  9 0
Quality Control

120  HAAS CNC VERTICAL MACHINING #1 0.00
HAAS 1  Memo 0.00  9 0
HAAS CNC vertical machine #1 1-Machine as per Folio FA627 & Dwg D3488□2-Deburr

| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
| | | | | | | | |
| | | | | | | | |

Part No: D3488-042 PAR #: _____ Fault Category: machining NCR: Yes No DQA: / Date: 10/11/12
 Resolution: rework Disposition: rework QA: N/C Closed: / Date: 10/11/12

| NCR: <u>66690</u> | | WORK ORDER NON-CONFORMANCE (NCR) | | | | | | |
|-------------------|------|---|------------------------------|--|----------------------------|-------------------------------|--|----------------------------|
| DATE | STEP | Description of NC Section A | Corrective Action Section B | | | Verification Section C | Approval Chief Eng | Approval QC Inspector |
| | | | Initial Chief Eng | Action Description Chief Eng | Sign & Date | | | |
| <u>10.9.28</u> | | <u>Vibration occurs when machining batch # 61685 despite program and feeding modifications that did improve the chances of a vibration free workpiece</u> | <u>CP</u> <u>10.09.28</u> | <u>- Open 2.150" to 2.165" to get under chatter marks and achieve an acceptable finish</u> | <u>/</u> <u>10.9.28</u> | <u>B.A</u> <u>10/10/25</u> | <u>CP</u> <u>10.09.28</u> <u>QSI 042</u> | <u>/</u> <u>100928</u> |
| | | <u>considerably during the operation of inside diameter finishing pass.</u> <u>RC process</u> | <u>CP</u> <u>10.09.28</u> | <u>down feedrate override as it occurs. (x2)</u> <u>Acceptable Per attached SR</u> | <u>/</u> <u>10.9.28</u> | <u>B.A</u> <u>10/10/25</u> | <u>CP</u> <u>10.09.28</u> | <u>/</u> <u>1009-28</u> |
| | | | | | | | | |

NOTE: Date & initial all entries

Work Order ID 61690

Tuesday, August 31, 2010 11:50:03 AM

Page 2

Item ID: D3488-042

Accept

Revision ID:

Item Name: Blade Fitting Assembly, RH

Start Date: 8/31/2010 Start Qty: 9.00

Required Date: 9/7/2010 Req'd Qty: 9.00

Reference:

Cust Item ID:

Customer:

Approvals:

Process Plan:

Date:

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Run

Start

Stop

Sequence ID/
Work Center IDOperation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

130

QC2- Inspect parts off machine FAI/FAIB

0.00

SL 10/10/25

9

0

QC

Memo

0.00

Quality Control

140

QC8- Inspect parts - second check

0.00

M.A 10/10/25

9

0

QC

Memo

0.00

Quality Control

150

Chemical Conversion Coat per QSI005 4.1

0.00

BR 10-10-26

9

HandFinish

Memo

0.00

Hand Finishing

| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
| | | | | | | | |
| | | | | | | | |

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

| NCR: | | WORK ORDER NON-CONFORMANCE (NCR) | | | | | | |
|------|------|----------------------------------|-----------------------------|---------------------------------|----------------|---------------------------|-----------------------|--------------------------|
| DATE | STEP | Description of NC Section A | Corrective Action Section B | | | Verification Section C | Approval Chief Eng | Approval QC Inspector |
| | | | Initial Chief Eng | Action Description Chief Eng | Sign & Date | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

NOTE: Date & initial all entries

Work Order ID 61690

Tuesday, August 31, 2010 11:50:03 AM

Page 3

Item ID: D3488-042

Accept

Setup Start

Revision ID:

Stop

Item Name: Blade Fitting Assembly, RH

Start Date: 8/31/2010 Start Qty: 9.00

Cust Item ID:

Required Date: 9/7/2010 Req'd Qty: 9.00

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start

QC:

Date:

SPC (Y/N):

Date:

Stop

Sequence ID/
Work Center IDOperation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

160



Powdercoat

Powder Coating

White Gloss(Ref:4.3.5.1) per QSI005 4.3-Alum

0.00 *BL 10-10-26**M115291*

Memo

0.00

START TIME:

FINISH TIME:

OVEN TEMPERATURE:

*3:30**1:50**2:20**9*

170



QC

Quality Control

QC3- Inspect Part Finish

0.00

=> M 10/11/09

Memo

0.00

*9**9*

180



HandFinish

Hand Finishing

HandFinishing

0.00

=> M 10/11/09

Memo

0.00

Install Inserts as per Dwg D3488

*9**10*

| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
| | | | | | | | |
| | | | | | | | |

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

| NCR: | | WORK ORDER NON-CONFORMANCE (NCR) | | | | | | |
|------|------|----------------------------------|-----------------------------|---------------------------------|----------------|---------------------------|-----------------------|--------------------------|
| DATE | STEP | Description of NC Section A | Corrective Action Section B | | | Verification Section C | Approval Chief Eng | Approval QC Inspector |
| | | | Initial Chief Eng | Action Description Chief Eng | Sign & Date | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

NOTE: Date & initial all entries

Work Order ID 61690

Tuesday, August 31, 2010 11:50:03 AM



Page 4

Item ID: D3488-042

Accept



Setup Start



Revision ID:

Stop



Item Name: Blade Fitting Assembly, RH

Start Date: 8/31/2010 Start Qty: 9.00



Cust Item ID:

Required Date: 9/7/2010 Req'd Qty: 9.00



Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start



QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop

Sequence ID/
Work Center IDOperation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

190

QC5- Inspect part completeness to step on W/O

0.00



QC

Memo

0.00

Quality Control

Accept Qty: 10
Reject Qty: 11
Reject Number: 09
Insp. Stamp: (9)

200

Identify as per dwg & Stock Location: F10-18

0.00



Packaging

Memo

0.00

Packaging

Accept Qty: 9
Reject Qty: 9

210

QC21- Final Inspection - Work Order Release

0.00



QC

Memo

0.00

Quality Control

Accept Qty: 10/11/10
Reject Qty: 9

me
10-11-9

| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
| | | | | | | | |
| | | | | | | | |

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

| NCR: | | WORK ORDER NON-CONFORMANCE (NCR) | | | | | | |
|------|------|----------------------------------|-----------------------------|---------------------------------|----------------|---------------------------|-----------------------|--------------------------|
| DATE | STEP | Description of NC Section A | Corrective Action Section B | | | Verification Section C | Approval Chief Eng | Approval QC Inspector |
| | | | Initial Chief Eng | Action Description Chief Eng | Sign & Date | | | |
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| | | | | | | | | |

NOTE: Date & initial all entries

Picklist Print

Tuesday, August 31, 2010 11:50:07 AM

Page 1

Work Order ID: 61690

Parent Item: D3488-042

Parent Item Name: Blade Fitting Assembly, RH

Start Date: 8/31/2010

Required Date: 9/7/2010

Start Qty: 9.00

Required Qty: 9.00

Comments: IPP Rev:A New Issue 06-02-28 JLM
IPP Rev:B As per Rev B 06-03-30 JLM
IPP Rev:C Now On Doosan Lathe JLM Verified BY:DD

| Component Item ID/ Item Name | Replacement Item ID | Mfg/ Purch | Bin Item | Primary Location | Last Location | Route Seq ID | Unit of Measure | Qty on Hand | Qty per Kit | Total Qty | Qty Issued | Date Issued | Status |
|---------------------------------|------------------------|---------------|-------------|---------------------|------------------|-----------------|--------------------|----------------|-------------|--------------|---------------|----------------|--------|
|---------------------------------|------------------------|---------------|-------------|---------------------|------------------|-----------------|--------------------|----------------|-------------|--------------|---------------|----------------|--------|

| | | | | | | | | | | | | | |
|---|--|-----------|--|----|--|--|------|----------|---|----|--|--|--|
| ALS7-1032-225 | | Purchased | | No | | | Each | 747.0000 | 4 | 36 | | | |
|  | | | | | | | | | | | | | |
| INSERT | | | | | | | | | | | | | |

| Location | Loc Qty | Loc Code |
|----------|---------|----------|
| ST282 | 747 | |
| 100896 | 100 | |
| 102018 | 47 | |
| 111529 | 300 | |
| 111581 | 300 | |

| | | | | | | | | | | | | | |
|---|--|--------------|--|----|--|--|------|---------|---|---|--|--|--|
| D6103-003 | | Manufactured | | No | | | Each | 19.0000 | 1 | 9 | | | |
|  | | | | | | | | | | | | | |
| Round Billet, Aluminum | | | | | | | | | | | | | |

| Location | Loc Qty | Loc Code |
|----------|---------|----------|
| MAT43 | 19 | |
| 42281 | 1 | |
| 55430 | 18 | |

61690 (X9)

| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
| | | | | | | | |
| | | | | | | | |

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

| NCR: | | WORK ORDER NON-CONFORMANCE (NCR) | | | | | | |
|------|------|----------------------------------|-----------------------------|---------------------------------|----------------|---------------------------|-----------------------|--------------------------|
| DATE | STEP | Description of NC Section A | Corrective Action Section B | | | Verification Section C | Approval Chief Eng | Approval QC Inspector |
| | | | Initial Chief Eng | Action Description Chief Eng | Sign & Date | | | |
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NOTE: Date & initial all entries

| | | |
|---|---------------------|--------------------|
| DART AEROSPACE LTD | Work Order: | 6690 |
| Description: Blade Fitting, RH / Turning Detail for D3488-1/-2 | Part Number: | D3488-2 |
| Inspection Dwg: D3488 / DSK101 Rev: B / D | | Page 1 of 2 |

FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article ☐ Prototype

| Drawing Dimension | Tolerance | Actual Dimension | Accept | Reject | Method of Inspection | Comments |
|-------------------|--------------------|------------------|--------|--------|----------------------|----------|
| Lathe Section | | | | | | |
| Ø2.150 | +/-0.005 | 2.150 | / | | | |
| Ø2.780 | +/-0.005 | 2.778 | / | | | |
| Ø3.125 | +/-0.010 | 3.124 | / | | | |
| Ø3.346 | +/-0.010 | 3.346 | / | | | |
| 0.125 x 45° | +/-0.010 x +/-0.1° | .125 x 45° | / | | | |
| 8.000 | +0.030/-0.000 | 8.015 | / | | | |
| 9.250 | +/-0.010 | 9.250 | / | | | |
| 0.188 | +/-0.010 | .188 | / | | | |
| R0.032 | +/-0.010 | R.032 | / | | | |
| R0.062 | +/-0.010 | R.062 | / | | | |
| Ø0.297 | +0.005/-0.001 | .300 | / | | | |
| Ø0.430 | +/-0.010 | .430 | / | | | |
| 0.100 | +/-0.010 | .100 | / | | | |
| 0.125 | +/-0.010 | .125 | / | | | |
| 2.620 | +/-0.010 | 2.620 | / | | | |
| 3.500 | +/-0.010 | 3.500 | / | | | |
| 1.005 | +/-0.010 | 1.005 | / | | | |
| Ø0.484 | +0.005/-0.001 | .484 | / | | | |
| 1.180 | +/-0.010 | 1.180 | / | | | |
| 3.150 | +/-0.010 | 3.150 | / | | | |
| 3.070 | +/-0.010 | 3.070 | / | | | |
| R0.063 | +/-0.010 | R.063 | / | | | |
| | | | | | | |
| | | | | | | |

| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
| | | | | | | | |
| | | | | | | | |

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

| NCR: | | WORK ORDER NON-CONFORMANCE (NCR) | | | | | | |
|------|------|----------------------------------|-----------------------------|---------------------------------|----------------|---------------------------|-----------------------|--------------------------|
| DATE | STEP | Description of NC Section A | Corrective Action Section B | | | Verification Section C | Approval Chief Eng | Approval QC Inspector |
| | | | Initial Chief Eng | Action Description Chief Eng | Sign & Date | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

NOTE: Date & initial all entries

| | | |
|---|---------------------|--------------------|
| DART AEROSPACE LTD | Work Order: | <i>61690</i> |
| Description: Blade Fitting, RH / Turning Detail for D3488-1/-2 | Part Number: | D3488-2 |
| Inspection Dwg: D3488 / DSK101 Rev: B / D | | Page 2 of 2 |

| Drawing Dimension | Tolerance | Actual Dimension | Accept | Reject | Method of Inspection | Comments |
|------------------------|---------------|------------------|-------------------------------------|--------|----------------------|----------|
| Milling Section | | | | | | |
| Ø0.508 | +0.006/-0.001 | <i>-.508</i> | <input checked="" type="checkbox"/> | | <i>vern JL3</i> | |
| 0.750 | +/-0.010 | <i>-.748</i> | <input checked="" type="checkbox"/> | | <i>H-G</i> | |
| 1.500 | +/-0.010 | <i>1.500</i> | <input checked="" type="checkbox"/> | | <i>vern JL3</i> | |
| 11.18 | +/-0.030 | <i>11.182</i> | <input checked="" type="checkbox"/> | | <i>H-G</i> | |
| R0.062 | +/-0.010 | <i>-.062</i> | <input checked="" type="checkbox"/> | | <i>R-G</i> | |
| 0.125 | +/-0.010 | <i>-.127</i> | <input checked="" type="checkbox"/> | | <i>vern JL3</i> | |
| 0.590 | +/-0.010 | <i>-.589</i> | <input checked="" type="checkbox"/> | | <i>H-G</i> | |
| 0.793 | +/-0.010 | <i>-.795</i> | <input checked="" type="checkbox"/> | | <i>"</i> | |
| 1.351 | +/-0.010 | <i>1.348</i> | <input checked="" type="checkbox"/> | | <i>"</i> | |
| 1.317 | +/-0.010 | <i>1.316</i> | <input checked="" type="checkbox"/> | | <i>vern JL3</i> | |
| 1.802 | +/-0.010 | <i>1.806</i> | <input checked="" type="checkbox"/> | | <i>H-G</i> | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| | | | |
|-----------------------------------|-------------------------------|----------------------------|-----|
| Measured by: <i>AL</i> | Audited by: <i>H.A</i> | Prototype Approval: | N/A |
| Date: <i>10-9-28/10/25</i> | Date: <i>10/10/25</i> | Date: | N/A |

| Rev | Date | Change | Revised by | Approved |
|-----|----------|-------------------------|------------------|-----------|
| A | 06.03.31 | New Issue | KJ/JLM | |
| B | 08.09.19 | Reformat P/O D3488-042 | KJ/JLM | |
| C | 08.12.02 | Dimension 8.000 removed | KJ/JLM <i>JA</i> | <i>JA</i> |

Dart Aerospace Ltd

| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
| | | | | | | | |
| | | | | | | | |

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

| NCR: | | WORK ORDER NON-CONFORMANCE (NCR) | | | | | | |
|------|------|----------------------------------|-----------------------------|---------------------------------|----------------|---------------------------|-----------------------|--------------------------|
| DATE | STEP | Description of NC Section A | Corrective Action Section B | | | Verification Section C | Approval Chief Eng | Approval QC Inspector |
| | | | Initial Chief Eng | Action Description Chief Eng | Sign & Date | | | |
| | | | | | | | | |
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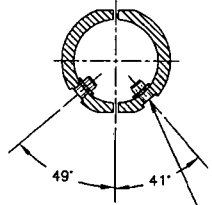
NOTE: Date & initial all entries

692 m E

SHOP COPY
RETURN TO
ENGINEERING

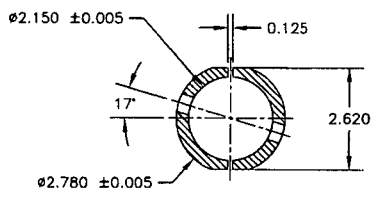
UNCONTROLLED
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER NO. 61690

BS10-8-31



SECTION B-B

Ø0.297
C'BORE Ø0.430 x 0.100
INSTALL ALS4-1032-225 (OR AKS4-1032-225
OR ALS7-1032-225 OR AKS7-1032-225)
INSERTS AFTER FINISH
(4 PLACES)



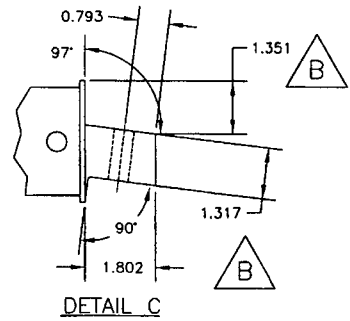
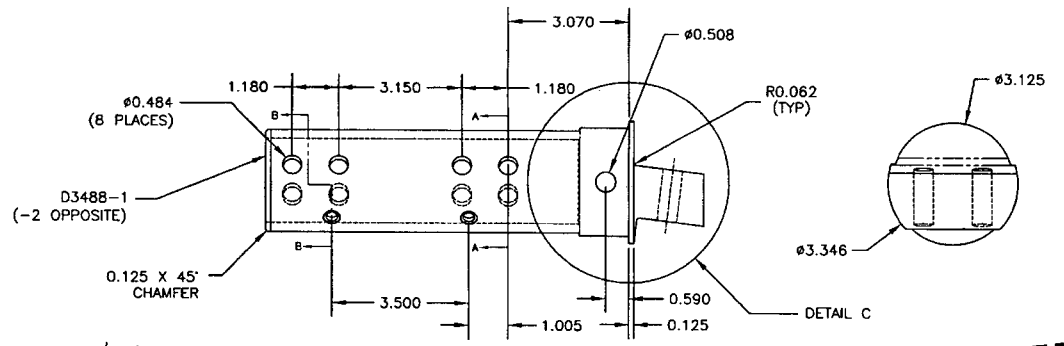
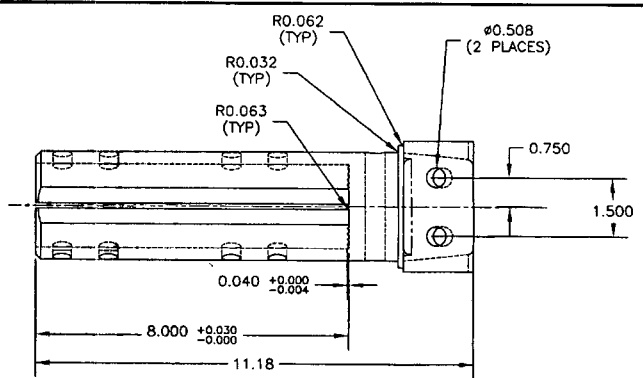
SECTION A-A

D3488-041/-042 BLADE FITTING ASSEMBLY PARTS LIST

| QTY -041 | QTY -042 | PART NUMBER | DESCRIPTION |
|-------------|-------------|---|-----------------------------|
| X | | D3488-041 | BLADE FITTING ASSEMBLY (LH) |
| | X | D3488-042 | BLADE FITTING ASSEMBLY (RH) |
| 1 | | D3488-1 | BLADE FITTING (LH) |
| | 1 | D3488-2 | BLADE FITTING (RH) |
| 4 | 4 | ALS4-1032-225 or AKS4-1032-225 or ALS7-1032-225 or AKS7-1032-225 | INSERT |

D3488-041/-042 BLADE FITTING

- 1) MATERIAL: MAKE D3488-1/-2 FROM ALUMINUM 7075-T7351 ROUND BAR PER QQ-A-225/9 (REF. DART MATERIAL SPEC M7075T73R)
- 2) FINISH: ACID ETCH, ALODINE PER DART QSI 005 4.1 POWDER COAT WHITE (REF 4.3.5.1) PER DART QSI 005 4.3
- 3) BREAK UNMARKED SHARP EDGES 0.010 TO 0.020
- 4) INSTALL INSERTS AFTER POWDER COAT
- 5) ALL DIMENSIONS ARE IN INCHES
- 6) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED



DETAIL C

D3488-041 SHOWN (D3488-042 OPPOSITE)

RELEASED
06.03.15 PH
PER DS
ELN #784

| | | |
|---------|----------|------------------|
| B | 06.03.15 | CHANGE THICKNESS |
| A | 05.12.20 | NEW ISSUE |
| DESIGN | PH | DRAWN BY PH |
| CHECKED | PH | APPROVED PH |
| DATE | 06.03.15 | TITLE |
| | | BLADE FITTING |
| | | SCALE 1:3 |

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DART DART AEROSPACE USA, INC.
PORT HADLOCK, MA

DRAWING NO. D3488
REV. B
SHEET 1 OF 1

| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
| | | | | | | | |
| | | | | | | | |

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

| NCR: | | WORK ORDER NON-CONFORMANCE (NCR) | | | | | | |
|------|------|----------------------------------|-----------------------------|---------------------------------|----------------|---------------------------|-----------------------|--------------------------|
| DATE | STEP | Description of NC Section A | Corrective Action Section B | | | Verification Section C | Approval Chief Eng | Approval QC Inspector |
| | | | Initial Chief Eng | Action Description Chief Eng | Sign & Date | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

NOTE: Date & initial all entries

5.4 Blade Comparison

The AS 350/355 skid tubes have a blade installed at the aft end of the skid tube to improve the transfer of load into the skid tube during landing, as is shown in Figure 5 of Reference 1. This blade is made of steel with the properties determined by the test documented in Reference 3 Page 3. Load is transferred to the AS skid tube using a machined fitting that is essentially tubular with provisions to bolt on the steel blade. This tube fitting is 9" long and slides into the aft end of the AS 350/355 skid tube. The blade is fastened to the tubular fitting using two 12 mm screws.

Drawing D2741 specifies the blade to be used in the Dart 350 skid tube design. This blade has identical overall dimensions as the AS part and is manufactured from 4130 steel with the same mechanical properties as the AS part. In the Dart system, fitting D2742 will be used to transfer load from the blade into the web of the skid tube assembly. On the outside of the skid tube, D2742 is dimensionally identical to the AS blade fitting. On the inside of the skid tube, D2742 has been designed to withstand higher bending moments than the AS fitting. Blade D2741 is fastened to D2742 using two 1/2" screws, which will be capable of transferring larger tensile loads than the 12 mm screws used in the AS 350 design.

The following table summarizes the analysis above and shows that the Dart system will be as good as or better than the AS system at transferring the tail down landing loads into the landing gear.

| <u>Component</u> | <u>AS 350 Skid tubes</u> | <u>Dart 350 Skid tubes</u> |
|------------------|--------------------------|----------------------------|
| Blade Ftu | 151.9 ksi (from test) | 152 ksi (D2741 dwg) |
| Blade Fty | 140.3 ksi (from test) | 141 ksi (D2741 dwg) |
| Blade bolts | 2 x 12 mm (0.47") dia. | 2 x 0.50" dia. |
| Fitting Ftu | 66.5 ksi (from test) | 81 ksi (D2742 dwg) |
| Fitting Fty | 61.3 ksi (from test) | 71 ksi (D2742 dwg) |
| Fitting bolt | 1 x 12 mm (0.47") dia. | 1 x 0.50" dia. |

The following calculations compare the bending moment transfer capabilities of the AS blade fitting vs. the Dart blade fitting at section A-A of Figure 5 in Reference 1.

Tensile Yield Allowables

$$M_{2y} := \frac{F_{ty4} \cdot I_{f2}}{c_{f2}} \quad M_{2y} = 55518.8 \cdot \text{lbs} \cdot \text{in} \quad \text{Max yield bending moment (Dart)}$$

$$M_{1y} := \frac{F_{ty3} \cdot I_{f1}}{c_{f1}} \quad M_{1y} = 45432.5 \cdot \text{lbs} \cdot \text{in} \quad \text{Max yield bending moment (AS)}$$

$$MS7 := \frac{M_{2y}}{M_{1y}} - 1 \quad MS7 = 0.22$$

$$M_{2y} = \frac{57,000 \cdot (2.778^4 - 2.175^4) \cdot \pi}{1.389 \cdot 64} = 74890 \text{ lbs} \cdot \text{in}$$

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Tensile Ultimate Allowables

$$M2y := \frac{Ftu4 \cdot If2}{cfo2} \quad M2y = 63338.35 \cdot \text{lbs} \cdot \text{in} \quad \text{Max ultimate bending moment (Dart)}$$

$$M1y := \frac{Ftu3 \cdot If1}{cfo1} \quad M1y = 49286.48 \cdot \text{lbs} \cdot \text{in} \quad \text{Max ultimate bending moment (AS)}$$

$$MS8 := \frac{M2y}{M1y} - 1 \quad MS8 = 0.29$$

$$M2y = \frac{68,000 \times (2.778^4 - 2.175^4) \pi}{1.389 \cdot 64} = 89,342 \text{ lbs} \cdot \text{in}$$

5.5 Fatigue and Stress Corrosion Cracking

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Stress corrosion cracking is the result of the combined effects of a corrosive environment and a static tensile stress. Stress corrosion cracking can result from the weight of the aircraft creating a static stress in the skidtube while the aircraft is sitting on the ground in a corrosive environment. The Dart Round-I-Beam skidtube design eliminates the problems of stress corrosion cracking longitudinally along the skidtubes because localized loading is transferred into the vertical member of the skidtube assembly. In the conventional round tube design, localized loads deflect the tube into an obround shape causing large stress regions both on top and bottom as well as longitudinally along the sides of the skidtube. Section 5.2 of this report demonstrates that the Dart configuration can take much larger localized loading than the AS configuration. Therefore, for a constant load, the Dart design has alleviated the problem by placing the primary load carrying member (the web of the I-beam) within the sealed environment of the skidtube.

Dart skidtubes are manufactured from 6061-T6 aluminum which is much better than 2024 in terms of fatigue life and resistance to corrosion and stress corrosion cracking. The data supporting the improved fatigue resistance is provided in Reference 2 on Pages 4 and 5. A table taken from the ASM Metals Handbook Desk Edition is included in Reference 2 on Page 6. This table documents the significantly improved resistance to corrosion and stress corrosion cracking for 6061-T6 as compared to 2024.

To summarize: fatigue and stress corrosion cracking resistance has been improved by designing a skidtube with lower stress levels, both static and fatigue, by selecting materials which are more resistant to fatigue and stress corrosion cracking, and by placing the primary load carrying member in a sealed environment, shielded from corrosive materials

5.6 Load Transfer into Crosstubes

On the AS 350/355 series of aircraft, the saddles are an integral part of the cross tubes. Dart will not be changing these saddles or the fasteners used to attach the skidtube to the crosstubes. Therefore, the moments transmitted into the crosstubes will be exactly the same.